



STGD7NB60H

N-CHANNEL 7A - 600V - DPAK

PowerMESH™ IGBT

TYPE	V _{CES}	V _{CE(sat)}	I _C
STD7NB60H	600 V	< 2.8 V	7 A

- HIGH INPUT IMPEDANCE
- LOW ON-VOLTAGE DROP (V_{cesat})
- OFF LOSSES INCLUDE TAIL CURRENT
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY
- VERY HIGH FREQUENCY OPERATION
- CO-PACKAGED WITH TURBOSWITCH
- TYPICAL SHORT CIRCUIT WITHSTAND TIME
5MICROS S-family, 4 micro H family
- ANTIPARALLEL DIODE

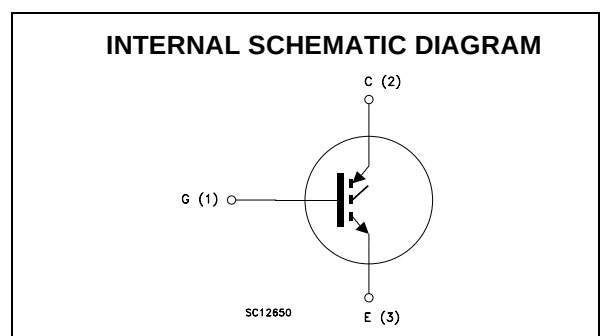
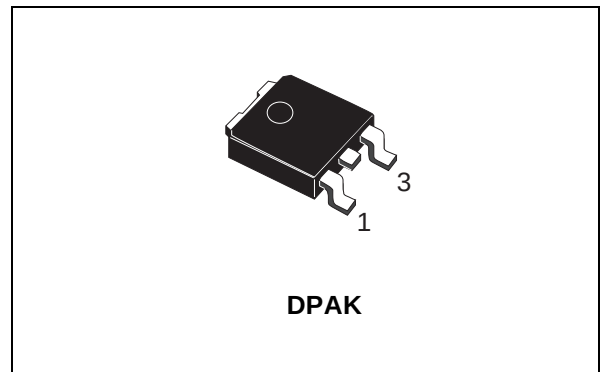
DESCRIPTION

Using the latest high voltage technology based on a patented strip layout, STMicroelectronics has designed an advanced family of IGBTs, the PowerMESH™ IGBTs, with outstanding performances.

The suffix "H" identifies a family optimized for high frequency applications (up to 50kHz) in order to achieve very high switching performances (reduced t_{fall}) maintaining a low voltage drop.

APPLICATIONS

- HIGH FREQUENCY MOTOR CONTROLS
- SMPS and PFC IN BOTH HARD SWITCH AND RESONANT TOPOLOGIES



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{CES}	Collector-Emitter Voltage (V _{GS} = 0)	600	V
V _{ECR}	Emitter-Collector Voltage	20	V
V _{GE}	Gate-Emitter Voltage	± 20	V
I _C	Collector Current (continuous) at T _C = 25°C	14	A
I _C	Collector Current (continuous) at T _C = 100°C	7	A
I _{CM} (■)	Collector Current (pulsed)	56	A
P _{TOT}	Total Dissipation at T _C = 25°C	55	W
	Derating Factor	0.44	W/°C
T _{stg}	Storage Temperature	-65 to 150	°C
T _j	Max. Operating Junction Temperature	150	°C

STGD7NB60H

THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	2.27	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	100	°C/W
Rthc-sink	Thermal Resistance Case-sink Typ	1.5	°C/W

ELECTRICAL CHARACTERISTICS (TCASE = 25 °C UNLESS OTHERWISE SPECIFIED)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{BR} (CES)	Collectro-Emitter Breakdown Voltage	I _C = 250 µA, V _{GE} = 0	600			V
I _{CES}	Collector cut-off (V _{GE} = 0)	V _{CE} = Max Rating, T _C = 25 °C V _{CE} = Max Rating, T _C = 125 °C			10 100	µA µA
I _{GES}	Gate-Emitter Leakage Current (V _{CE} = 0)	V _{GE} = ± 20V, V _{CE} = 0			±100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{GE} (th)	Gate Threshold Voltage	V _{CE} = V _{GE} , I _C = 250µA	3		5	V
V _{CE} (sat)	Collector-Emitter Saturation Voltage	V _{GE} = 15V, I _C = 7 A V _{GE} = 15V, I _C = 7 A, T _J = 125°C		2.3 1.9	2.8	V V

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs}	Forward Transconductance	V _{CE} = 25 V, I _C = 3 A	3.5	5		S
C _{ies}	Input Capacitance	V _{CE} = 25V, f = 1 MHz, V _{GE} = 0		560		pF
C _{oes}	Output Capacitance			68		pF
C _{res}	Reverse Transfer Capacitance			15		pF
Q _g Q _{ge} Q _{gc}	Total Gate Charge Gate-Emitter Charge Gate-Collector Charge	V _{CE} = 480V, I _C = 7 A, V _{GE} = 15V		42 7.9 17.6	55	nC nC nC
I _{CL}	Latching Current	V _{clamp} = 480 V, T _J = 150°C R _G = 10 Ω	28			A

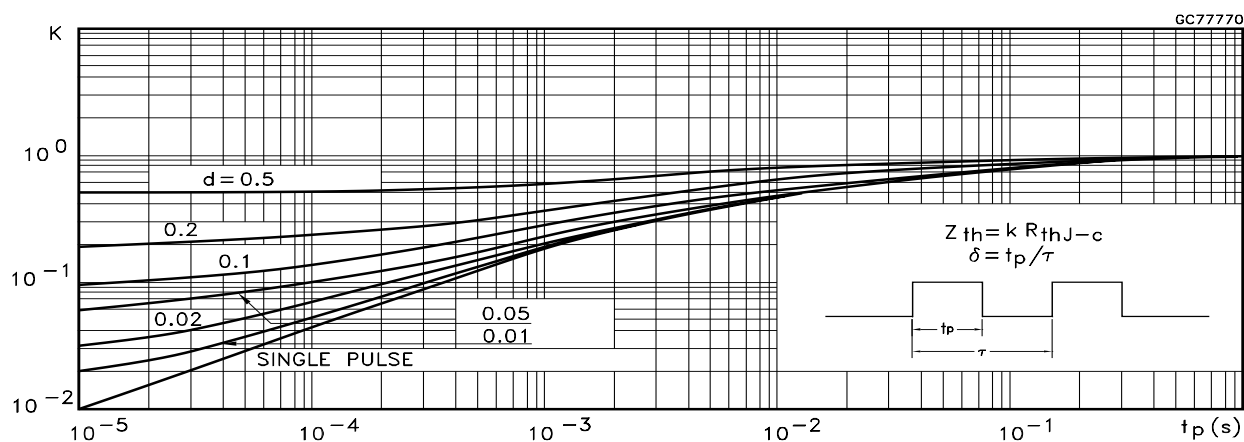
SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t _d (on) t _r	Turn-on Delay Time Rise Time	V _{CC} = 480 V, I _C = 7 A R _G = 10Ω, V _{GE} = 15 V		15 48		ns ns
(di/dt) _{on} E _{on}	Turn-on Current Slope Turn-on Switching Losses	V _{CC} = 480 V, I _C = 7 A R _G = 10Ω V _{GE} = 15 V, T _J = 125°C		160 70		A/µs µJ

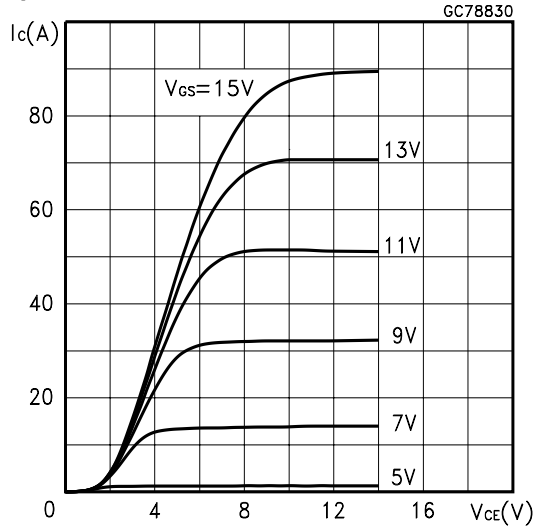
ELECTRICAL CHARACTERISTICS (CONTINUED)**SWITCHING OFF**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c	Cross-over Time	$V_{CC} = 480 \text{ V}$, $I_C = 7 \text{ A}$, $R_{GE} = 10 \Omega$, $V_{GE} = 15 \text{ V}$		85		ns
$t_r(V_{off})$	Off Voltage Rise Time			20		ns
$t_{d(off)}$	Delay Time			75		ns
t_f	Fall Time			70		ns
$E_{off(**)}$	Turn-off Switching Loss			85		μJ
E_{ts}	Total Switching Loss			130		μJ
t_c	Cross-over Time	$V_{CC} = 480 \text{ V}$, $I_C = 3 \text{ A}$, $R_{GE} = 10 \Omega$, $V_{GE} = 15 \text{ V}$, $T_j = 125^\circ\text{C}$		150		ns
$t_r(V_{off})$	Off Voltage Rise Time			50		ns
$t_{d(off)}$	Delay Time			110		ns
t_f	Fall Time			110		ns
$E_{off(**)}$	Turn-off Switching Loss			220		μJ
E_{ts}	Total Switching Loss			290		μJ

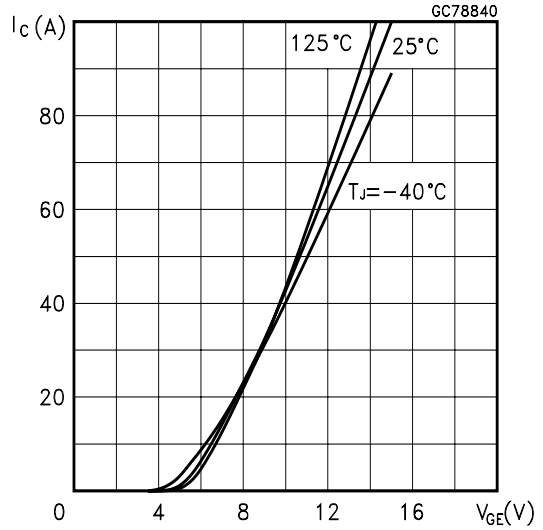
Note: 1. Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.
 2. Pulse width limited by max. junction temperature.
 (***) Losses include Also the Tail (Jedec Standardization)

Thermal Impedance

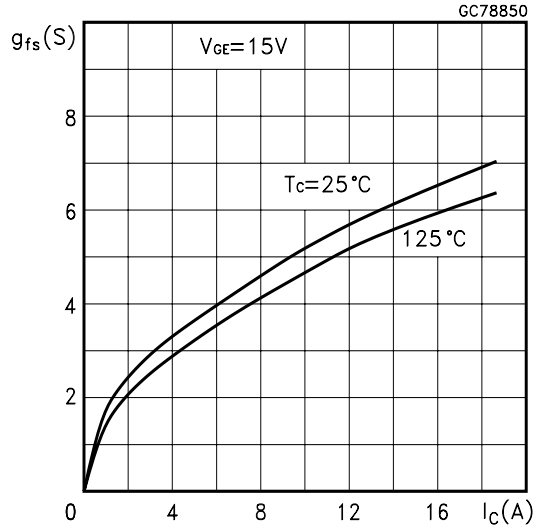
Output Characteristics



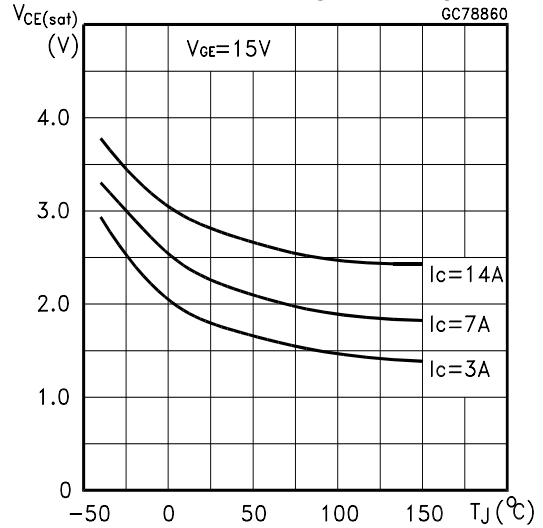
Transfer Characteristics



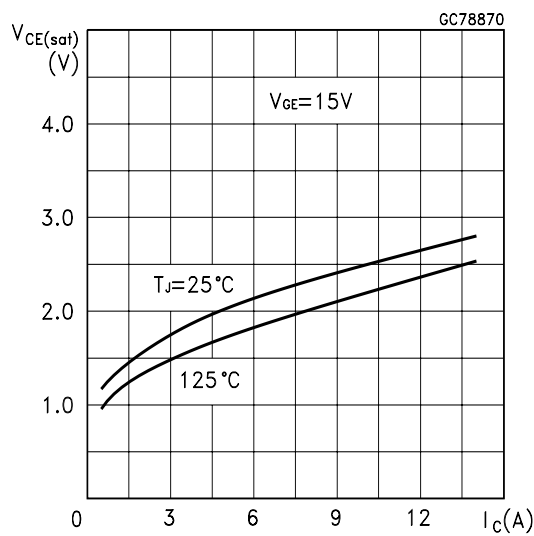
Transconductance



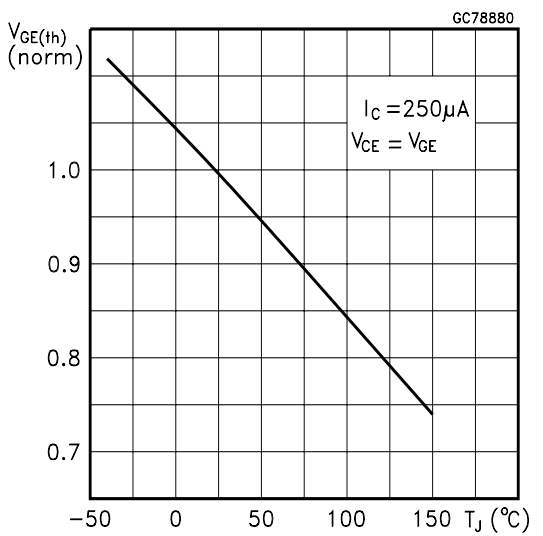
Collector-Emitter On Voltage vs Temperature



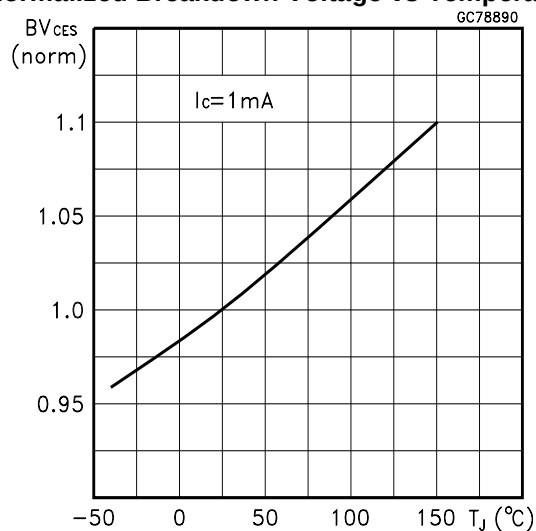
Collector-Emitter On Voltage vs Collector Current



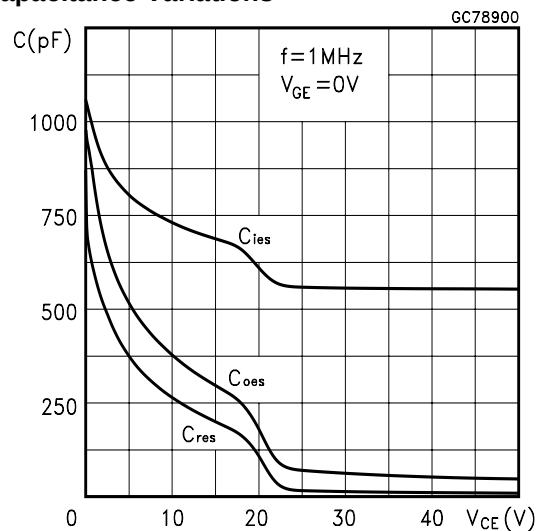
Gate Threshold vs Temperature



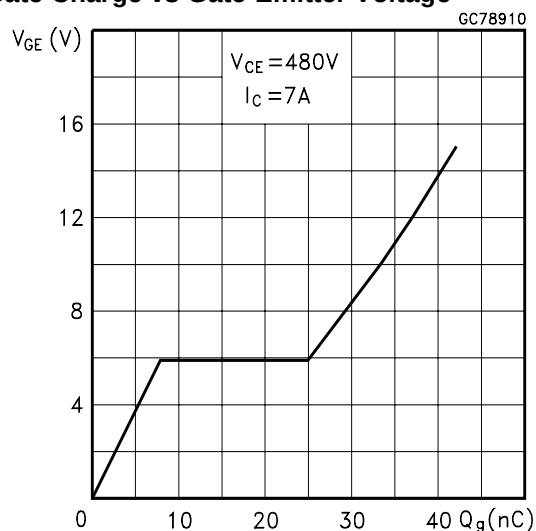
Normalized Breakdown Voltage vs Temperature



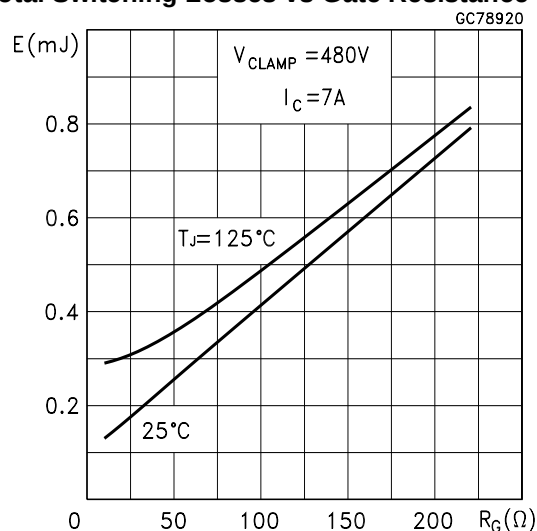
Capacitance Variations



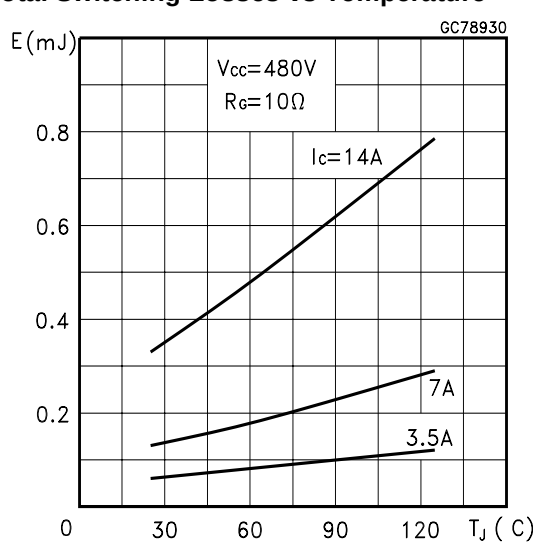
Gate Charge vs Gate-Emitter Voltage



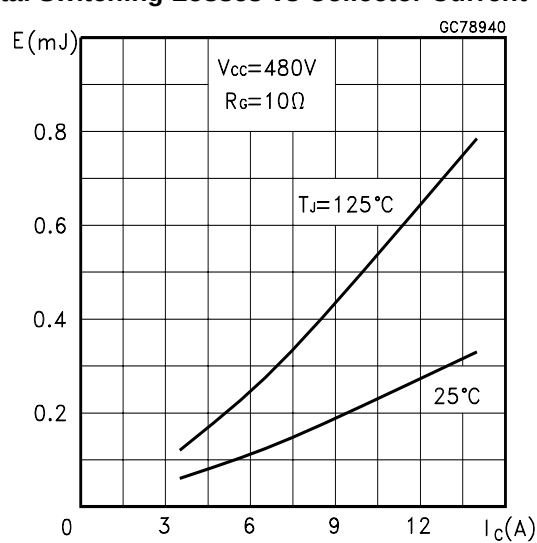
Total Switching Losses vs Gate Resistance



Total Switching Losses vs Temperature



Total Switching Losses vs Collector Current



Switching Off Safe Operating Area

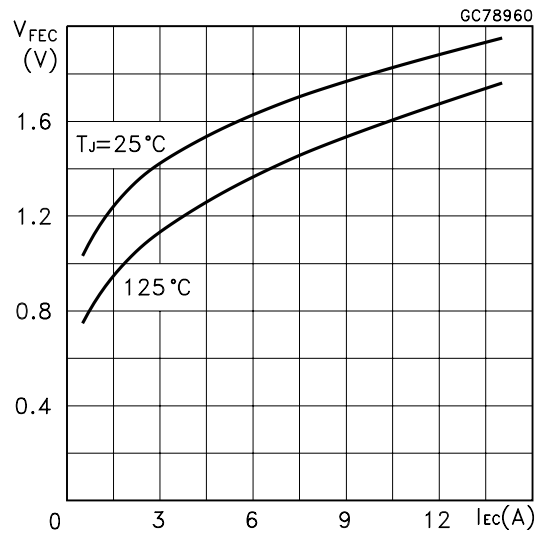
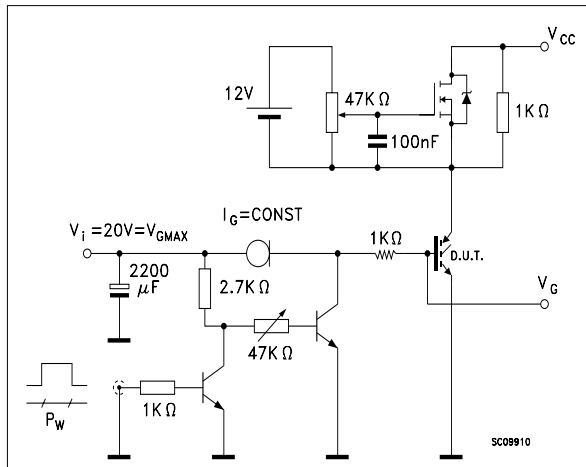
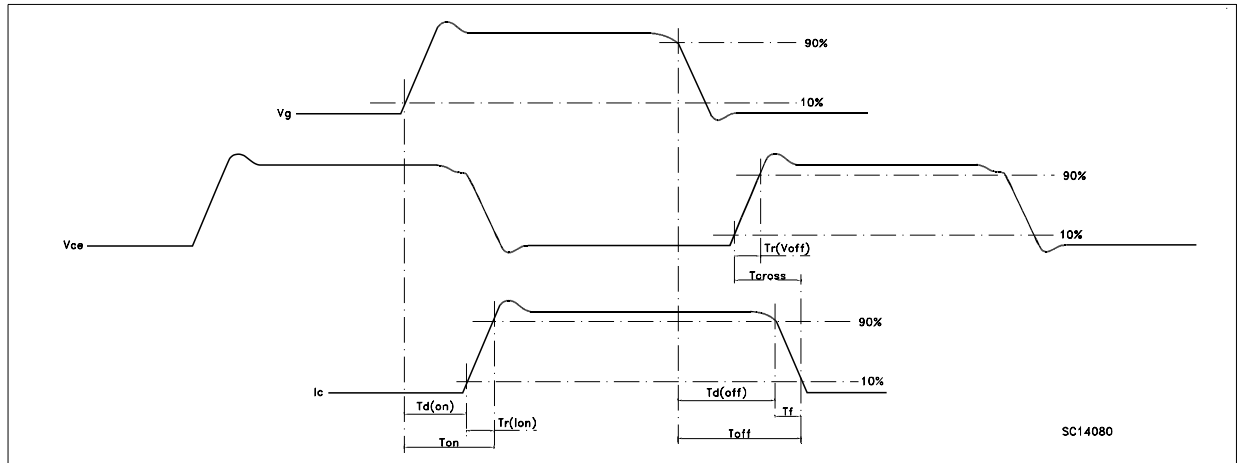
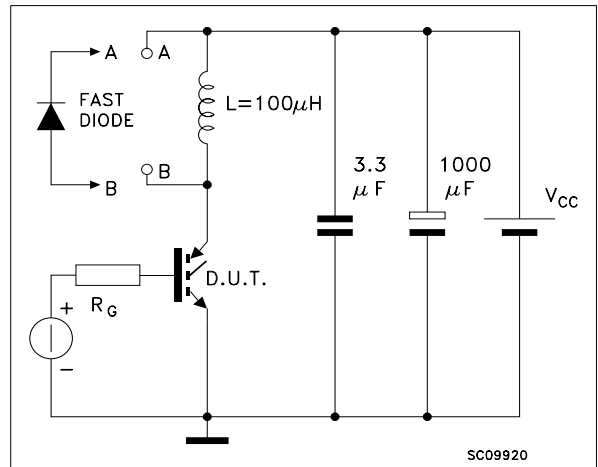
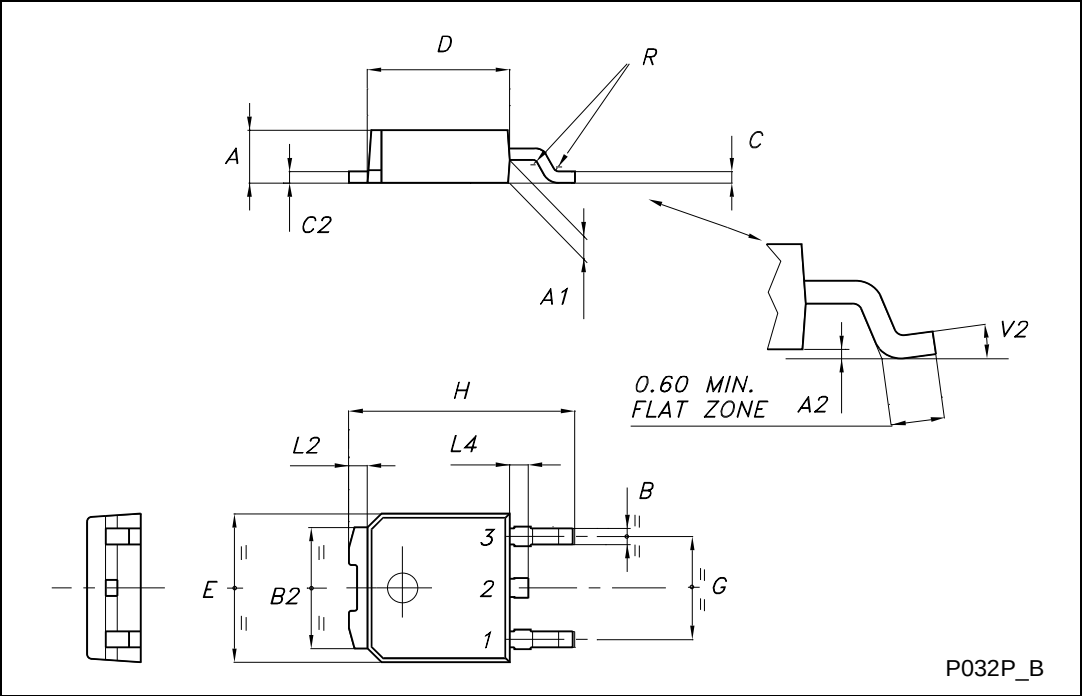


Fig. 1: Gate Charge test Circuit**Fig. 2: Test Circuit For Inductive Load Switching**

TO-252 (DPAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.20		2.40	0.087		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.90	0.025		0.035
B2	5.20		5.40	0.204		0.213
C	0.45		0.60	0.018		0.024
C2	0.48		0.60	0.019		0.024
D	6.00		6.20	0.236		0.244
E	6.40		6.60	0.252		0.260
G	4.40		4.60	0.173		0.181
H	9.35		10.10	0.368		0.398
L2		0.8			0.031	
L4	0.60		1.00	0.024		0.039
V2	0°		8°	0°		0°



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specification mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a trademark of STMicroelectronics

© 2000 STMicroelectronics – Printed in Italy – All Rights Reserved

STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - China - Finland - France - Germany - Hong Kong - India - Italy - Japan - Malaysia - Malta - Morocco -
Singapore - Spain - Sweden - Switzerland - United Kingdom - U.S.A.

<http://www.st.com>